

REMARKS

Claims 1 and 3-12 have been rejected under 35 U.S.C. §103(a) as being obvious over admitted prior art in view of U.S. Patent No. 6,134,537 to Pao et al. ("Pao").

Claim 2 has been previously canceled.

Claims 1 and 3-12 remain pending.

Rejection of Claims 1 and 3-12 under 35 U.S.C. Section 103(a)

With respect to independent claims 1, 10, 11, and 12, the Office Action states that the admitted prior art detailed in Applicant's application teaches the Applicant's claimed invention excluding using Principal Component Analysis (PCA). Further, the Office Action states that Pao teaches PCA because Pao teaches methods to improve computational efficiency that are compatible with Radial Base Function (RBF) architecture, and that it would have been obvious to one of ordinary skill in the art, at the time of the invention, to add the teaching of Pao to the admitted prior art.

Pao teaches a system for reduced-dimension mapping of pattern data. Mapping is applied through conventional single-hidden-layer feed-forward neural network with non-linear neurons. The system functions to equalize and orthogonalize lower dimensional output signals by reducing the covariance matrix of the output signals to the form of a diagonal matrix, or constant times the identity matrix. The system allows for visualization of large bodies of complex multidimensional data in a low-dimension approximation to reduce randomness associated with other methods with similar purposes, and to keep the mapping computationally efficient at the same time.

Pao discusses PCA to point out its limitations, and teach why it is not used in the system taught by Pao. Specifically, at Col. 2, lines 21-23, Pao states that PCA in pattern recognition has a failing insofar as what is retained is not necessarily that which helps interclass discrimination.

Part of the system taught by Pao involves reducing dimensions of input data with a system that employs nonlinear outputs using a nonlinear variance-constraint method, whereas part of Applicants' invention teaches reducing dimensions of input data with a system that involves linear outputs using PCA. Pao teaches at Col. 4, lines 10-11, that linear PCA methods are limited by their linear nature. Moreover, Pao specifically describes the limitations of PCA with respect to dimension reduction at Col 10, lines 49-52. In particular, Pao states that PCA computations of a co-variance matrix are lengthy, and that linear constraints lead to loss of information when dimension reduction is large.

Since the Applicants' invention involves reducing the dimensions of input data using a system and method that employs linear outputs derived from PCA, and Pao teaches reducing the dimension of input data with a system that uses nonlinear outputs using the nonlinear variance-constraint method, it is clear that Pao teaches away from using PCA by discussing the limitations and failings of PCA. It would therefore not be obvious, to one skilled in the art, to combine the teachings of Pao with Applicants' admitted prior art.

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (CAFC 1983), cert. denied, 469 U.S. 851 (1984)

In view of the foregoing, it is respectfully submitted that the admitted prior art and Pao, whether taken alone or in combination, do not teach or suggest the subject matter recited in claims 1, 10, 11, and 12, as each of these references fails at least to teach or suggest systems, methods, and articles of manufacture for classifying inputs to a neural network. Specifically, the references, alone or combined, do not teach or suggest performing Principal Component Analysis (PCA) on a plurality of inputs to the neural network to produce a plurality of PCA outputs and coupling each of the plurality of PCA outputs to a plurality of output nodes. Further, the references do not teach or suggest multiplying each coupled PCA

output by a weight selected for the coupled PCA output and calculating a node output for each output node. Moreover, the references, alone or combined, do not teach selecting a maximum output from the plurality of node outputs and associating an output class with the maximum output. In fact, Pao teaches away from combining PCA with Applicants' admitted prior art by discussing, at length, the limitations and failings of PCA with respect to data dimension reduction using linear methods.

Claims 3-9, which depend directly or indirectly from the independent claims 1, 10, 11, and 12, incorporate all of the limitations of corresponding independent claim and are therefore patentably distinct over the admitted prior art in view of Pao for at least those reasons provided for claims 1, 10, 11, and 12.

Conclusion

In view of the foregoing, applicants respectfully requests reconsideration, withdrawal of all rejections, and allowance of all pending claims in due course.

Respectfully submitted,


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